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A PORTABLE SEED COTTON SCALE TRAILER FOR RESEARCH PLOTS

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Yields from experimental seed cotton plots, whether used for comparison of cotton varieties, agronomic practices, or effects of mechanization, remain as one of the most used measurements in cotton research programs. Before the advent of mechanical cotton harvesters, the seed cotton weights from test plots were easily obtained by weighing each hand picker's pick-sack. However, when mechanical harvesting became the standard method, the problem of transferring seed cotton from the picker basket to a weighing device and subsequently to the wagon was presented.

The hand-operated cotton plot sling (figure 1) has been generally used to weigh seed cotton from mechanically harvested small experimental plots. This system was satisfactory for weights of less than 80 pounds of seed cotton when operated on a reasonably calm day. However, even with a slight breeze it was difficult to read the scale accurately and to handle the sling during unloading. Probably the greatest limitation was the small plot size of 0.02 acre necessary to keep weights below 80 pounds in high-yielding cotton.

Other researchers have developed bagging units for attachment to the harvester blower or elevator discharge.<sup>2/</sup> A similar method consists of having one or two workers ride in the picker basket and put the cotton in bags by hand.

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<sup>2/</sup> "Cotton Picker Sacking Attachment for Harvesting Small Plots," Smith, H. P. and Brown, E. C. Jr., Agricultural Engineering, Vol. 34 - No. 4, April 1953.



Figure 1.--Cotton plot sling, 1949.

The advantage of these two methods is that several small plots can be harvested without returning to the trailer to unload; or sample bags can be dropped to the ground at plot ends and picked up later. As with the sling, plot size is limited by the capacity of the bags available.

The portable cotton plot scale trailer described in this report was designed to weigh seed cotton from the smallest mechanically harvested plots to the maximum capacity of a single row cotton harvester basket. Other design features considered were: Portability, one-man operation, scale accuracy to 1 pound, and suitable speed of operation to handle two single row cotton pickers without delays in harvesting.

#### DESCRIPTION AND OPERATION

The portable cotton plot scale trailer consists of five major components: (1) Scale, (2) main frame, (3) lifting frame, (4) basket, and (5) hydraulics (figure 2, A, B). The scale used in this rig was a 3,000 pound capacity (1-pound increments) portable single-animal livestock scale without the scale platform and stock rack. The main frame on the trailer was designed so that no loads are applied to the scale frame during the dumping cycle but the basket sits free upon the scale for weighing. During the dumping cycle the basket is secured to the lifting frame with simple locks on the lifting arm (figure 3).



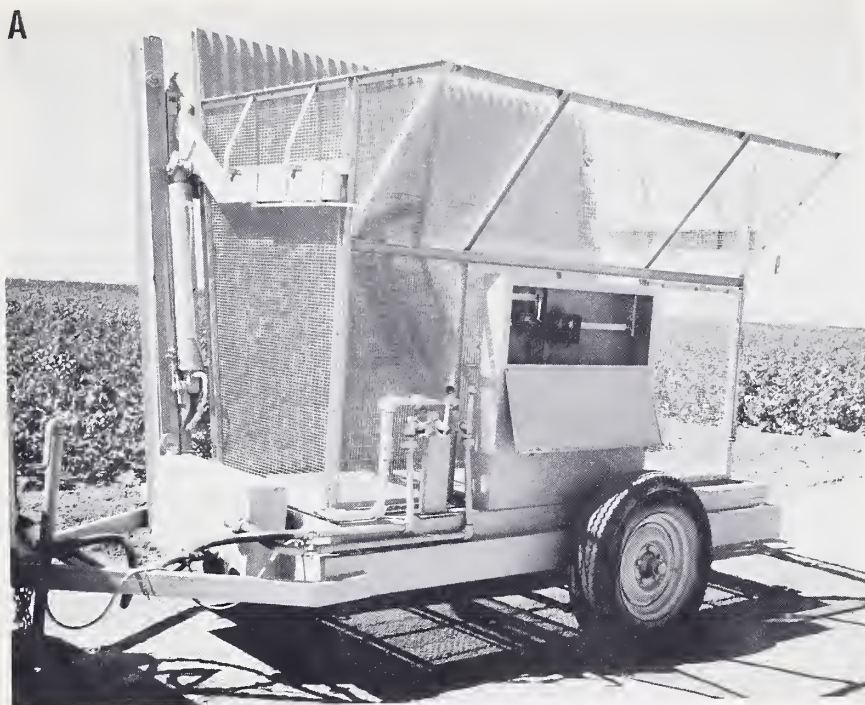


Figure 2.--Portable cotton plot scale trailer,  
1959: A, left side view; B, right side view.



Figure 3.--Detail of basket to lifting frame  
sliding locks.

In operation the cotton harvester dumps the seed cotton directly into the scale basket after which the weight is obtained. One hydraulic lift cylinder is then used to lift the frame until the bottom of the basket clears the scale beam box (figure 4, A). The second hydraulic control valve activates the tilting cylinders and the cotton is dumped into the wagon (figure 4, B). The basket is then returned to the retracted position for the next load. The complete operation takes 35 seconds, if a 15 g.p.m. (gallons per minute) hydraulic pump is used.

For transport, sliding locks are left fastened and the scale beam is disconnected from the scale mechanism. The lifting frame is then lowered until all of its weight holds the basket against the scale mechanism, thus securing the basket and the scale.

The portable cotton plot scale is prepared for operation by levelling, with a bubble level located in the scale beam box, from front to rear with a screw-type jack on the tongue. Normally it is not necessary to level the trailer from side to side unless one wheel is more than 3 inches lower than the other. The supports under the outriggers (figure 2, B) located on the right side are adjusted so only a few pounds of the trailer weight is supported. A large part of the total weight of the basket and cotton is transferred to these supports during the dumping cycle due to tire deflection.



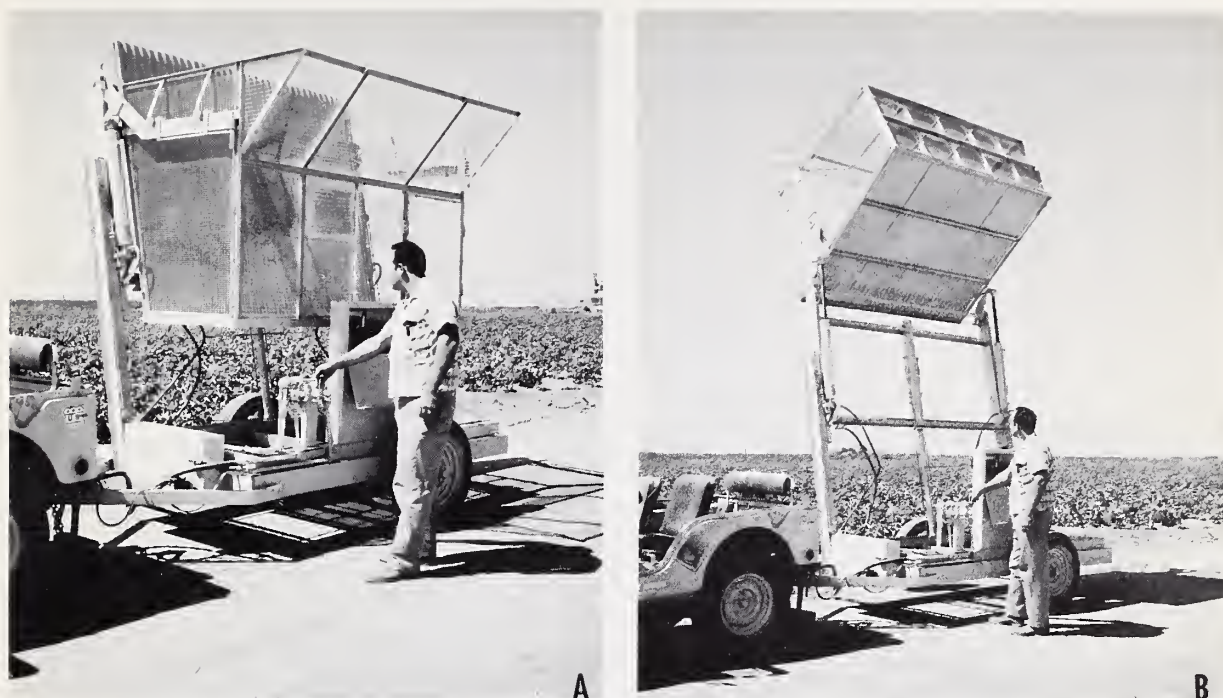


Figure 4.--Portable cotton plot scale trailer basket: A, partially elevated; B, fully extended and tilted.

#### CONSTRUCTION

The scale basket has a capacity of approximately 156 cubic feet and will easily hold a normal cotton picker basket load of seed cotton. Construction details for the main frame and lifting frame are shown in figures 5 and 6.

The hydraulic system (figure 7) includes a pump powered by a 1/4 ton truck PTO (Power Take-Off). The minimum pump capacity for suitable operation should be 15 g.p.m. The lifting hydraulic cylinder was single acting with a 2-1/4 inch bore and a 42 inch stroke. This cylinder size should be increased to 2-3/4 inches if loads of greater than 1,000 pounds are anticipated. Two 3-1/2 by 24 inch cylinders were used for tilting. The pressure relief was set at 1,000 p.s.i. (pounds per square inch).

A 3,000 pound capacity axle with electric brakes and a coaxial spring were used on the portable cotton plot scale trailer. Since the total weight of the trailer was 2,690 pounds, the brakes were necessary for safety at normal highway speeds. The spring axle is necessary to protect the scale mechanism from excessive shock during transportation. The axle was so

located under the trailer as to allow 300 pounds of the weight to be on the trailer tongue. The trailer was unstable at speeds over 30 m.p.h. (miles per hour) when only 120 pounds were placed on the tongue. A 1-inch screw was mounted on each side of the main frame to lock the axle solidly to the frame except for transportation. Six-ply 7.00-16 tires were used.

More detailed construction instructions may be obtained from the authors on request.

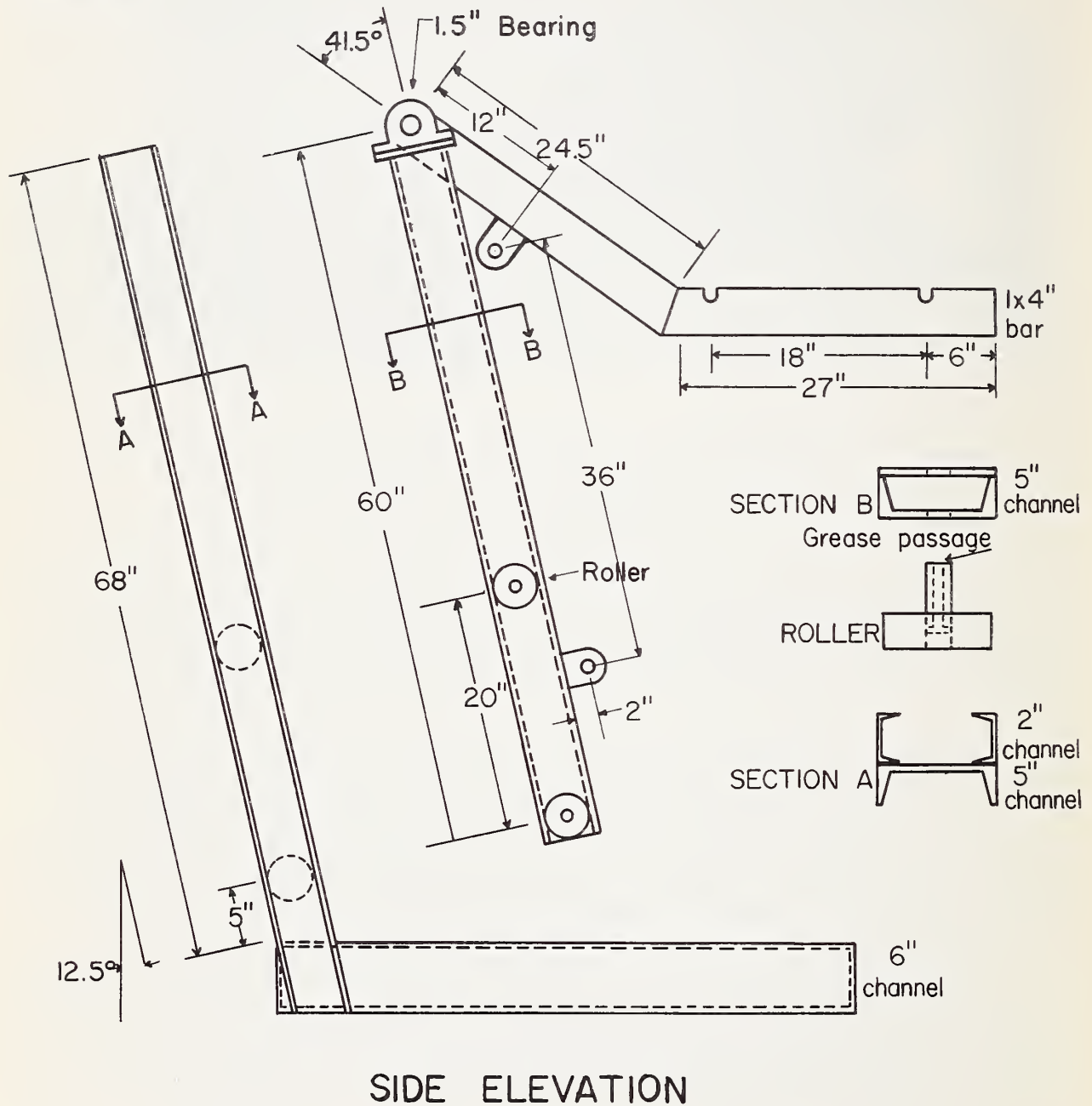
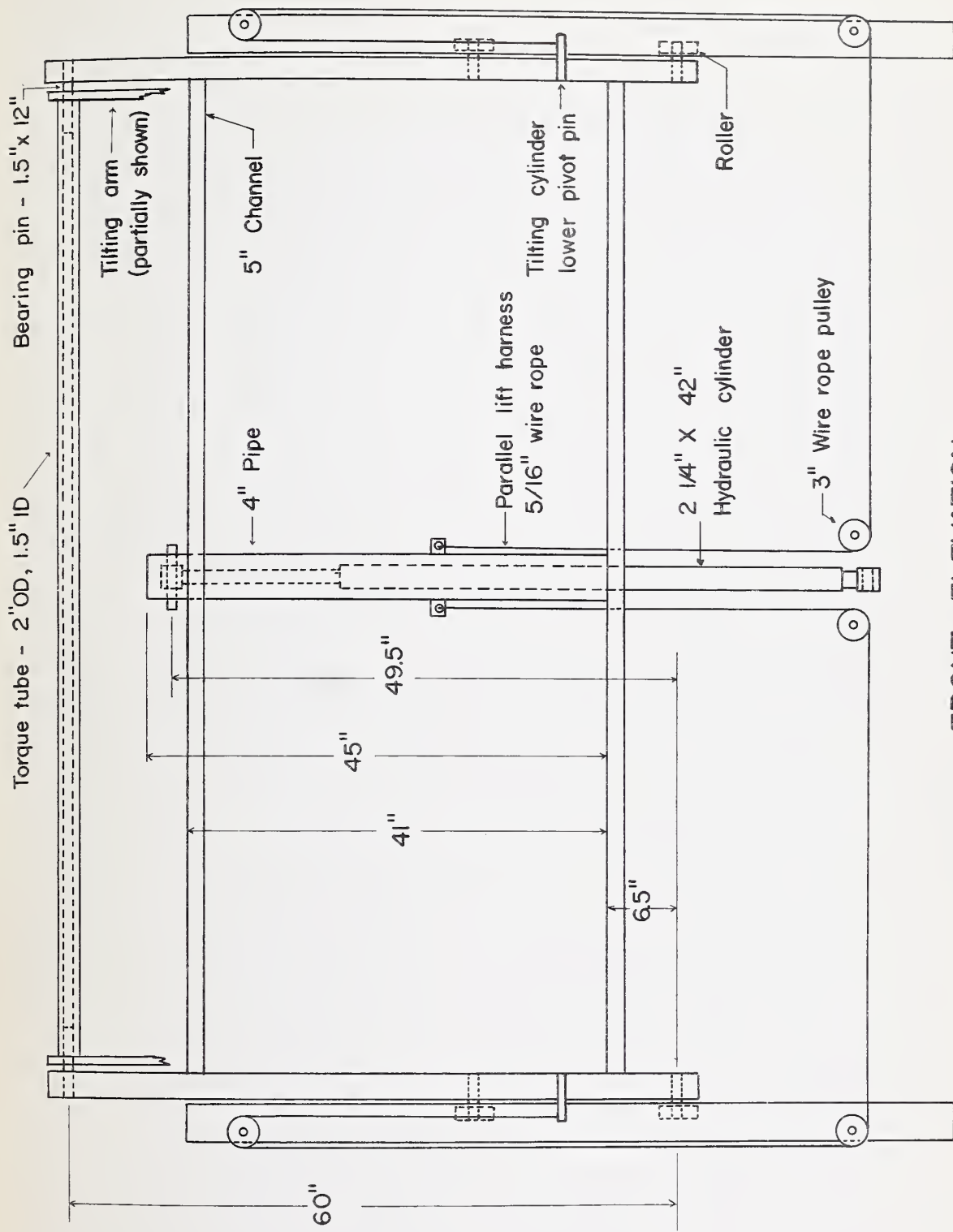


Figure 5.--Main frame and lifting frame.





# FRONT ELEVATION

Figure 6. Main frame and lifting frame.

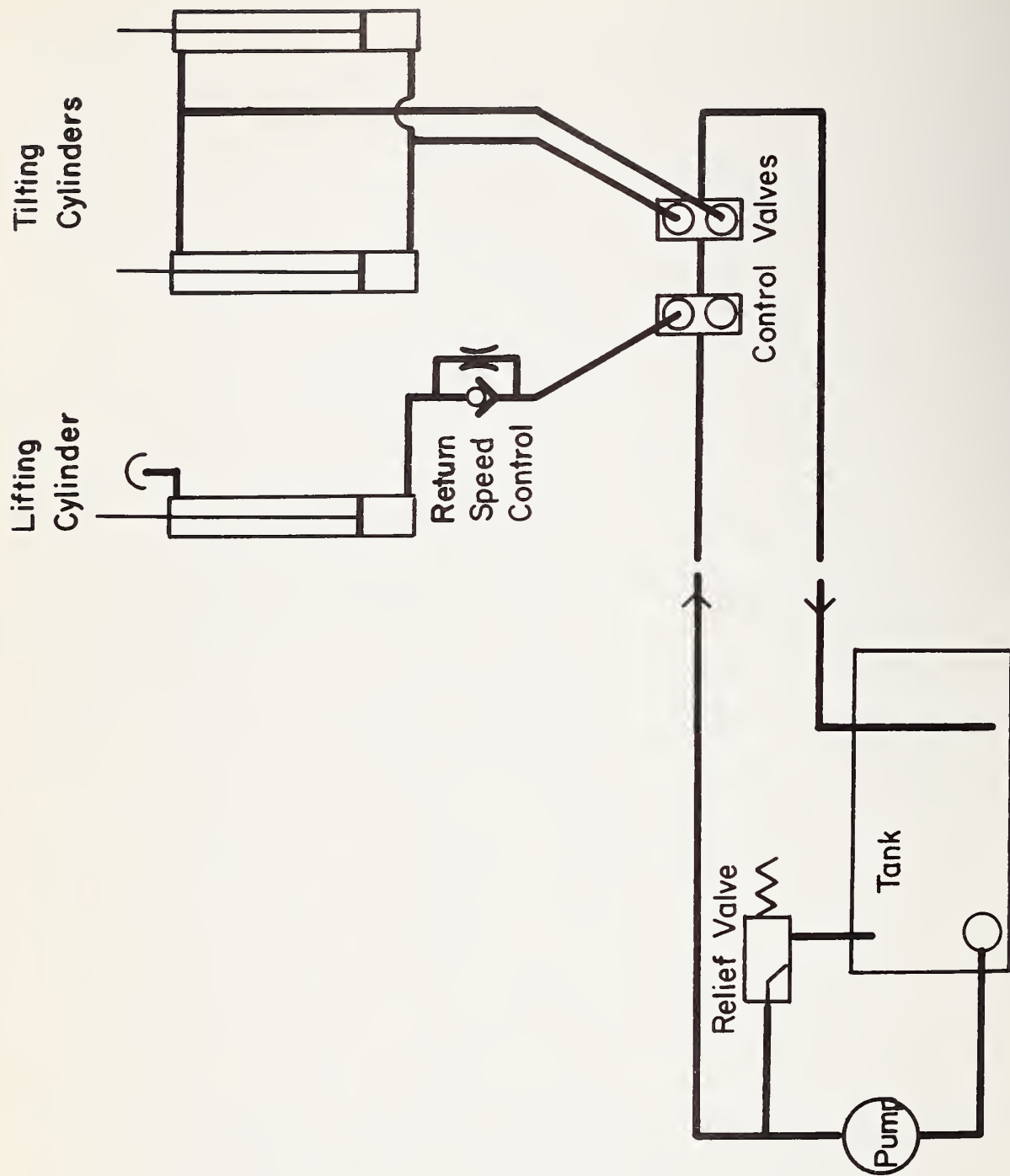


Figure 7. Diagram of hydraulic circuit.